

REMARKS

This paper responds to the Office Action mailed on July 13, 2006.

No claims are amended, no claims are canceled, and no claims are added; as a result, claims 1-13, 52, 53, and 60-62 remain pending in this application. Applicants incorporate all prior arguments herein in order to preserve all issues for appeal.

Applicant further informs the examiner that a divisional application was filed, assigned serial no. 11/460,021, and published as 2006/0258113A1.

§102 Rejection of the Claims

Claims 1-4, 8-13 and 60 were rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,362,068 to Summerfelt *et al.* (hereinafter, “the Summerfelt reference”). Applicant strenuously disagrees with the stated grounds of rejection and desires to further clarify various distinctions of the present invention over the cited art. Reconsideration of the present application is therefore requested in light of the following remarks.

Although the disclosed embodiments of the invention may be discussed in comparison to the prior art, it is understood that any discussion of the disclosed embodiments, as well as any discussion of the differences between the disclosed embodiments of the present invention and the prior art do not define the scope or interpretation of any of the claims. Instead, such discussed differences, if presented, are offered solely to help the Examiner appreciate important claim distinctions.

In general, for a reference to be anticipatory, all elements of the claim must be present, either explicitly or inherently, in a single prior art reference. In rejecting claims under 35 U.S.C. §102(e), the Examiner admits that different degrees of oxidation in layers comprising the disclosed dielectric structure is not explicitly taught, nor is inherently present in the various embodiments of the present invention. The Examiner further admits that the present anticipation rejection is not based upon evidence, such as the art of record in the present case. Instead, the Examiner relies upon a “logical argument” to provide the element that is missing from the cited reference by insisting that different degrees of oxidation, or differences in oxygen concentration in various layers are taught in the Summerfelt reference because Summerfelt discloses “metal-rich dielectric layers”.

Applicants' representative is unaware of any basis for a claim rejection for want of novelty that is based, at least in part, upon a "logical argument" or other reasoning that is not based upon the evidence (*e.g.*, a single reference of record), either inherently or explicitly. Accordingly, Applicants' representative respectfully submits that the Examiner's present rejection of claims under 35 U.S.C§ 102(e) is improperly based, and should be removed.

Turning now to the Summerfelt reference, an electrode interface structure using high dielectric-constant materials is disclosed. Referring now in particular to Figure 3, the disclosed structure includes an electrode structure 30, and a strontium titanate (ST) layer 32 applied to the electrode structure 30. An additional ST layer 36 is applied to the structure, with a barium strontium titanate (BST) layer 34 interposed between the ST layers 32 and 36. As best understood, the Examiner bases his "logical argument" on the bald assertion that differences in oxidation levels between layers in the dielectric structure is equivalent to differences in a concentration of a "free metal" in the dielectric layers allegedly disclosed in the Summerfelt reference.

Assuming, *arguendo*, that the Examiner's position regarding the asserted reference is valid (which Applicants do not), it is still not evident *where* in the cited reference the asserted disclosure may be found. Applicant, in particular, notes that Summerfelt does disclose at column 4, lines 7-9 that: "...The deposition of the of the ST layers 32 and 36, and the BST layer 34 may be performed using *substantially the same processes...*" (Emphasis added). Further, at column 4, lines 14-17, Summerfelt also discloses that: "...Since the ST 32 and 36, and BST 34 are *substantially similar chemically...*" (Emphasis added). Accordingly, Applicants submit that, even according to the Examiner's own erroneous standard, the reference does not support the assertion that the disclosed layers include different concentrations of a "free metal". Instead, the Summerfelt reference teaches forming dielectric layers having *substantially the same chemical composition*, and are formed using *substantially the same processes*.

Turning now to the claims, differences between the cited reference and the claim language will be specifically pointed out. Claim 1, in pertinent part, presently recites: "A substrate assembly, comprising...a plurality of high-K dielectric layers over said support surface, wherein a common metal is present in at least two adjacent layers of said plurality, *and wherein at least two layers of said plurality exhibit different degrees of oxidation*" (Emphasis added).

Summerfelt simply does not teach this. Claim 1 is therefore allowable. Claims depending from claim 1 are also allowable based upon the allowable form of the base claim, and further in view of the additional limitations recited in the dependent claims.

Claim 8 presently recites in pertinent part: “A capacitor dielectric, comprising...a first high-K capacitor dielectric comprising a metallic element...and...a second high-K capacitor dielectric comprising said metallic element, *having a lower oxygen density than said first high-K capacitor dielectric, and contacting said first high-K capacitor dielectric*” (Emphasis added). By any standard, Summerfelt simply does not disclose this. Claim 8 is also allowable. Claims depending from claim 8 are also allowable based upon the allowable form of the base claim, and further in view of the additional limitations recited in the dependent claims.

Claim 12, in pertinent part, presently recites: “A capacitor dielectric, comprising...a first high-K capacitor dielectric comprising a metallic element...a second high-K capacitor dielectric comprising said metallic element and contacting said first high-K capacitor dielectric...wherein said first high-K capacitor dielectric and said second high-K capacitor dielectric are oxides, *wherein said first high-K capacitor dielectric contains a first amount of oxygen per unit volume, and wherein said second high-K capacitor dielectric contains a second amount of oxygen per unit volume different from said first amount*” (Emphasis added). The Summerfelt reference simply does not disclose this. Claim 12 is therefore also allowable. Claims depending from claim 12 are also allowable based upon the allowable form of the base claim, and further in view of the additional limitations recited in the dependent claims.

Claim 13 presently recites: “A capacitor structure, comprising...a dielectric layer disposed over said first electrode layer, wherein said dielectric layer comprises a plurality of consecutively-positioned sub-layers, *wherein each of said sub-layers comprises a high-dielectric-constant material, wherein said dielectric layer comprises an element common to all sub-layers of said plurality, and wherein one of said sub-layers is more oxidized than another of said sub-layers...*” (Emphasis added). Yet again, the Summerfelt reference simply does not disclose this. Claim 13 is therefore also allowable.

Claim 52 presently recites: “A capacitor dielectric, comprising a plurality of capacitor dielectric layers...wherein each layer of said plurality is a high-K dielectric...*wherein at least one layer of said plurality manifests greater oxidation than would an equal thickness of an*

underlying layer of said plurality, and wherein each layer of said plurality comprises a metal oxide included within an adjacent layer of said plurality" (Emphasis added). Summerfelt does not disclose this. Claim 52 is therefore also allowable. Claims depending from claim 52 are also allowable based upon the allowable form of the base claim, and further in view of the additional limitations recited in the dependent claims.

Finally, claim 62 presently recites: "A capacitor dielectric, comprising a plurality of capacitor dielectric layers...*wherein at least one layer of said plurality manifests greater oxidation than would an equal thickness of an underlying layer of said plurality, wherein each layer of said plurality comprises a metal oxide included within an adjacent layer of said plurality, and wherein the underlying includes a means to minimize oxidation beyond the plurality of capacitor dielectric layers*" (Emphasis added). Again, Summerfelt does not disclose this. Claim 62 is therefore also allowable.

In view of the foregoing, Applicants respectfully request removal of all claim rejection based upon 35 U.S.C. §102(e).

§103 Rejection of the Claims

Claims 5-7, 52, 53, 61 and 62 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Summerfelt reference as applied to claims 1-4 and 8-13 above, and further in view of the comments on page 3 through 5 of the Office Action, which describes the Examiners' position regarding his "logical argument". Applicants again strenuously disagree with the stated grounds of rejection.

Referring again to the claim language, differences between the applied art and the claim language will be specifically pointed out. Claims 5-7 and 61 stem from independent claim 1. Again, claim 1 presently recites: "A substrate assembly, comprising...a plurality of high-K dielectric layers over said support surface, wherein a common metal is present in at least two adjacent layers of said plurality, *and wherein at least two layers of said plurality exhibit different degrees of oxidation*" (Emphasis added). Summerfelt simply does not teach this or suggest this. Instead, Summerfelt discloses forming dielectric layers having substantially the same composition and formed in substantially the same manner. Accordingly, in this regard, Summerfelt *teaches away* from the embodiments disclosed in the present application.

Accordingly, claim 1 is allowable over the cited reference. Claims 5-7 and 61, which depend from claim 1 are also therefore allowable.

Claim 13 presently recites: “A capacitor structure, comprising...a dielectric layer disposed over said first electrode layer, wherein said dielectric layer comprises a plurality of consecutively-positioned sub-layers, *wherein each of said sub-layers comprises a high-dielectric-constant material, wherein said dielectric layer comprises an element common to all sub-layers of said plurality, and wherein one of said sub-layers is more oxidized than another of said sub-layers...*” (Emphasis added). Yet again, the Summerfelt reference simply does not disclose or suggest this in any motivated sense. Claim 13 is allowable.

Again, claim 52 presently recites: “A capacitor dielectric, comprising a plurality of capacitor dielectric layers...wherein each layer of said plurality is a high-K dielectric...*wherein at least one layer of said plurality manifests greater oxidation than would an equal thickness of an underlying layer of said plurality, and wherein each layer of said plurality comprises a metal oxide included within an adjacent layer of said plurality*” (Emphasis added). Summerfelt does not disclose this or fairly suggest this. Claim 52 is therefore also allowable. Claim 53, which depends from claim 52 is also therefore allowable.

Claim 62 presently recites: “A capacitor dielectric, comprising a plurality of capacitor dielectric layers...*wherein at least one layer of said plurality manifests greater oxidation than would an equal thickness of an underlying layer of said plurality, wherein each layer of said plurality comprises a metal oxide included within an adjacent layer of said plurality, and wherein the underlying includes a means to minimize oxidation beyond the plurality of capacitor dielectric layers*” (Emphasis added). Again, Summerfelt does not disclose or fairly suggest this. Claim 62 is therefore also allowable.

In view of the foregoing, Applicants respectfully request removal of all claim rejection based upon 35 U.S.C. §103(a).

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 349-9587 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

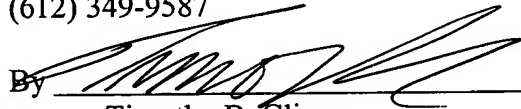
Respectfully submitted,

GURTEJ S. SANDHU ET AL.

By their Representatives,

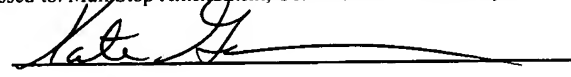
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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop Amendment, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 13 day of December 2006.

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